(e) A strain gauge has a gauge factor of 4. If the strain gauge is attached to a metal bar that stretches from 0.25 to 0.255 mm when strained, what is the percentage change in resistance ? If the unstrained value of gauge factor is 120 Ω, what is the resistance value of gauge factor after application of strain ?

(f) Design the Wheatstone bridge arrangement employed for the measurement of Strain for the Quarter Bridge, Half Bridge and Full Bridge with respective sensitivity.

2 Attempt any four parts : **5×4=20**

(a) Describe the Load cell with constructional feature of Ring type load cell and show how their output signals enable further processing for indication.

(b) Describe the method of measurement of differential pressure using inductive type transducer and differentiate between Absolute, Gauge and Differential pressure referred in this case.

(c) A resistive Transducer with a resistance of 5K Ω and a shaft distance is 5 inch is used in arrangement as shown in figure. Potentiometer $R_3$-$R_4$ is also 5K and $V_t$ is 5V. the initial position to be used as reference point is such that $R_1$=$R_2$. At the start of the test, Potentiometer $R_3$-$R_4$ is adjusted so that the bridge is balanced ($V_o$=0). Assuming that the object being monitored moves



(ii) Twenty one data channels, with subcarrier centre frequency ranging from 400 Hz to 165 KHz have been designated for telemetry use. All have a frequency deviation of ±7.5%. Assuming modulation index of 5, obtain intelligence bandwidth of channel first for a centre frequency of 70 KHz. Assuming that frequency division have been used.

(b) What factors discriminate the Electronic Wattmeter from dynamometer type Wattmeter and explain the working of Analog Electronic Wattmeter with Schematic diagram.

(c) (i) Describe the Working Principle of the Integrating Type Digital voltmeter with suitable diagram and Waveform Representation.

(ii) What method should be preferred for the measurement of frequency ? Describe it with proper functional diagram.

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